

**REMARKS**

Applicants appreciate the Examiner's thorough review of the present application, and respectfully request reconsideration in light of the preceding amendments and the following remarks.

**Claims in general**

Claims 1-2, 5-8, 10, 12, 17-18 and 21 are pending in the application. Claims 3-4, 9, 11, 13-16, 19-20 have been cancelled without prejudice or disclaimer. Claims 7-8, 10, and 18 have been amended only to improve claim language. Claims 1, 6, 12 and 17 have been amended to more particularly define the claimed invention.

Specifically, claim 1 and 17 have been amended to include the feature that the Ag-Al alloy contains **about 5 to about 10 at% of silver**. This feature is originally found in claims 3-4 and 19-20.

Claim 6 has been amended to include the feature that the thin film of Ag-Al alloy is annealed at temperatures from **about 200 °C to about 250 °C**.

Claim 12 has been amended to depend from claim 6 and include the added features that the Ag-Al alloy contains about 10 at% of silver and that the reflective electrodes have a visible light reflectance greater than 97%. Support for the above features is found in the specification, page 7, lines 1-7.

New claim 21 has been added to provide the Applicant with the scope of protection to which he is believed entitled. Support for this amendment is found in the specification (e.g., page 6, lines 32-33 and page 7, lines 1-2).

**Rejection of claims 13-16 under 35 U.S.C. 102(b)**

This rejection is moot as claims 13-16 have been cancelled.

**Rejection of claims 1-5 and 17-20 under 35 U.S.C. 103(a)**

Claims 1 and 17 are directed to a thin film transistor panel comprising a gate line with a gate electrode on a substrate; a gate insulating layer on the gate line; a semiconductor layer on the gate insulating layer; a conductive pattern layer with source and drain electrodes spaced apart on the semiconductor layer; a passivation layer on the semiconductor layer and the conductive pattern layer; and a plurality of pixel electrodes on the passivation layer.

Amended claim 1 specifically requires that the conductive pattern layer (hereinafter referred to as “S/D metal film”) comprise a first molybdenum layer, an Ag-Al alloy layer containing about 5 to about 10 at% of silver on the first molybdenum layer and a second molybdenum layer on the Ag-Al alloy layer. Amended claim 17 specifically requires that the **gate line** comprise an Ag-Al alloy layer which contains about 5 to about 10 at% of silver on the substrate and a molybdenum layer on the Ag-Al alloy layer.

It has been found by Applicant, based on extensive studies of the relevant technology, that if the etching rate of the molybdenum layer is not compatible with the etching rate of the Ag-Al alloy layer, then a step coverage problem occurs for both the passivation layer and the pixel electrode. In this situation, the passivation layer may fail to completely cover the S/D metal film; and hence there may be a short circuit between the S/D metal and the pixel electrode. It has also been found by Applicant that it is possible to significantly reduce the step coverage problem by adjusting the content of silver in the Ag-Al alloy layer. Thereafter, it has been determined by the inventor of the present invention that a taper profile can be obtained in the etching process

utilized to form the S/D metal film by keeping the content of silver in the Ag-Al alloy layer within the range of about 5 to about 10 at%. See for example page 6 lines 6-18 of the specification. Therefore, Applicant respectfully submits that the claimed silver content ranges as recited in amended claim 1 is critical and is not obvious to a person of ordinary skill in the art since the claimed silver content ranges in the Ag-Al alloy layer produce unexpected results as set forth above.

*Kaneko et al.* (U.S. Patent No. 6,433,842) teach a S/D metal film of Mo-Zr/Al-Nd/Mo-Zr. The Al alloy taught by *Kaneko* is not an Ag-Al alloy layer. *Jeong et al.* (U.S. Patent No. 6,486,514) teach a S/D metal film of an Ag-Al alloy layer. However, *Jeong* does not teach or suggest an Ag-Al alloy layer containing about 5 to about 10 at% of silver as presently claimed.

The Examiner's reliance on *Iwasaki* (U.S. Patent No. 5,986,204) in his 35 U.S.C. 103(a) rejections of claims 3-5, 19-20 is inappropriate because *Iwasaki* is non-analogous art.

"In order to rely on a reference as a basis for rejection of an applicant's invention [under 35 U.S.C. 103(a)], the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also In re Deminski, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986); In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992) See MPEP, section 2141.01(a).

The present invention relates to thin film transistor (TFT) panels employed in a flat display. *Iwasaki* relates to a photovoltaic cell. See Abstract and column 1, line 5 of *Iwasaki*. Thus, *Iwasaki* is *not* in the field of the present inventor's endeavor nor pertinent to the particular problem with which the present inventor was concerned. An inventor facing a problem in the art of TFT panels would *not* have looked for a solution in the art of photovoltaic cells. The 35 U.S.C. 103(a)

rejections relying on *Iwasaki* are thus erroneous and should be withdrawn.

In addition, even if *Iwasaki* was analogous art applicable against the claims of the instant application, it would not have been obvious to combine the *Iwasaki* reference with the other applied references in the manner suggested by the Examiner. It is acknowledged that *Iwasaki* discloses a **reflecting layer** comprising an Ag-Al alloy having a content of silver equal to or less than 30 at% to obtain a **high reflectivity**. See also page 4, line 8 of the Office Action. However, the total area of the S/D metal film on a TFT panel is very small as compared to the pixel electrodes. Therefore, a person of ordinary skill in the art, upon learning of the teaching of *Iwasaki*, would have been motivated to, at best, using the *Iwasaki* Ag-Al alloy containing at most 30 at% of silver **to form the pixel electrodes** of the TFT panel of *Kaneko* as modified in view of *Jeong*. A person of ordinary skill in the art would not have been motivated to modify the *Kaneko/Jeong* S/D metal with the *Iwasaki* Ag-Al alloy because a S/D metal layer does not need the *Iwasaki* disclosed advantage of high reflectivity. See, e.g., FIG. 1 of *Kaneko* where it is depicted that the S/D metal 7/8/9 is *buried* under passivation layer 10 and pixel electrode 11. Thus, even if *Iwasaki* was properly combinable with other applied references, the properly combined device would still lack all limitations of the invention claimed in claims 1 and 17.

Withdrawal of the Examiner's 35 U.S.C. 103(a) rejections of independent claims 1 and 17 is therefore believed appropriate and courteously solicited. Claims 2, 5 and 18 depend either from claim 1 or claim 17, and are considered patentable at least for the reasons advanced with respect to amended claim 1 and 17.

**Rejection of claims 6-12 under 35 U.S.C. 103(a)**

This rejection is traversed because *Iwasaki* is non-analogous art as detailed above. Nevertheless, Applicants have amended claim 6 to further define over the applied art.

Claim 6 is directed to a liquid crystal display comprising a top plate comprising a transparent electrode; a bottom plate comprising reflective electrodes; and a liquid crystal layer sandwiched between the top plate and the bottom plate.

Amended claim 6 specifically requires that the reflective electrodes be formed of an **annealed Ag-Al alloy** layer which has been annealed at temperatures from about 200 °C to about 250 °C. This feature is significant because, if the Ag-Al alloy of the present invention is annealed at temperatures from 200 °C to 250 °C, the visible light reflectance of the annealed Ag-Al alloy is significantly increased. For example, the visible light reflectance of the Ag-Al alloy (10% of silver) is increased from about 95 % (before annealing) to about 97 % (after annealing). See for example page 7 lines 1-7 of the specification. In addition, it has been determined by the inventors of the present invention that the visible light reflectance of the Ag-Al alloy (5% of silver) is increased from about 95 % (before annealing) to about 98 % (after annealing). See the reflectance observed at the mean wavelength, 550 nm, of the visible range of the spectrum as shown in the attached Exhibit A.

In page 6 line 3 of the Office Action, the Examiner alleged that *Iwasaki* discloses a reflecting layer 102 comprising an annealed thin film of Ag-Al alloy. However, Applicants have carefully reviewed the applied reference and still failed to locate any teachings of an annealed thin film of Ag-Al alloy. It is respectfully requested that the Examiner provides column and line numbers of the *Iwasaki* patent where the allegedly disclosed feature might be found or suggested. Note that when the *Iwasaki* reference is considered as a whole, the reference specifies that it is desirable to form the Al-Ag alloy film at a temperature equal to or less than 110 °C (col. 5, lines 64-67).

For the present case, nowhere did the cited references teach or suggest the unique feature that the reflective electrodes are formed of an annealed Ag-Al alloy layer which has been

annealed at temperatures from about 200 °C to about 250 °C. Accordingly, even if the teachings of *Park* and *Iwasaki* were combined, which Applicants contend to the contrary as detailed at the beginning of this sub-section, the resulting device would still fail to disclose or teach every limitation of amended claim 6. The Examiner's 35 U.S.C. 103(a) rejection of claims 6 should therefore be withdrawn. Claims 7-8, 10 and 12 depend from claim 6, and are considered patentable at least for the reasons advanced with respect to amended claim 6.

Furthermore, amended claim 12 and new claim 21 are patentable over the applied references not only for the reasons advanced with respect to claim 6 from which they depend, but also on their own specific merits since claims 12 and 21 recite features of the invention not taught by the applied references. Namely, claim 12 limits claim 6 to have an annealed Ag-Al alloy that contains about 10 at% of silver and reflective electrodes that have a visible light reflectance greater than 97%, whereas claim 21 limits claim 6 to have an annealed Ag-Al alloy that contains about 10 at% of silver and reflective electrodes that have a visible light reflectance greater than 95%. As apparent from Fig. 5 of the *Iwasaki* patent, a reflectivity of greater than 95% can only be obtained for Ag-Al alloys containing more than 90 at% of silver. However, the manufacturing cost of forming reflective electrodes from Ag-Al alloys containing more than 90at% of silver as taught by *Iwasaki* is much higher than the presently claimed reflective electrodes having about the same reflectivity. This again shows unexpected results achieved by using the claimed annealed Ag-Al alloy.

Each of the Examiner's rejections has been traversed/overcome. Accordingly, Applicants respectfully submit that all claims, i.e., claims 1-2, 5-8, 10, 12, 17-18 and 21, are now in condition for allowance. Early and favorable indication of allowance is courteously solicited.

The Examiner is invited to telephone the undersigned, Applicant's attorney of record, to facilitate advancement of the present application.

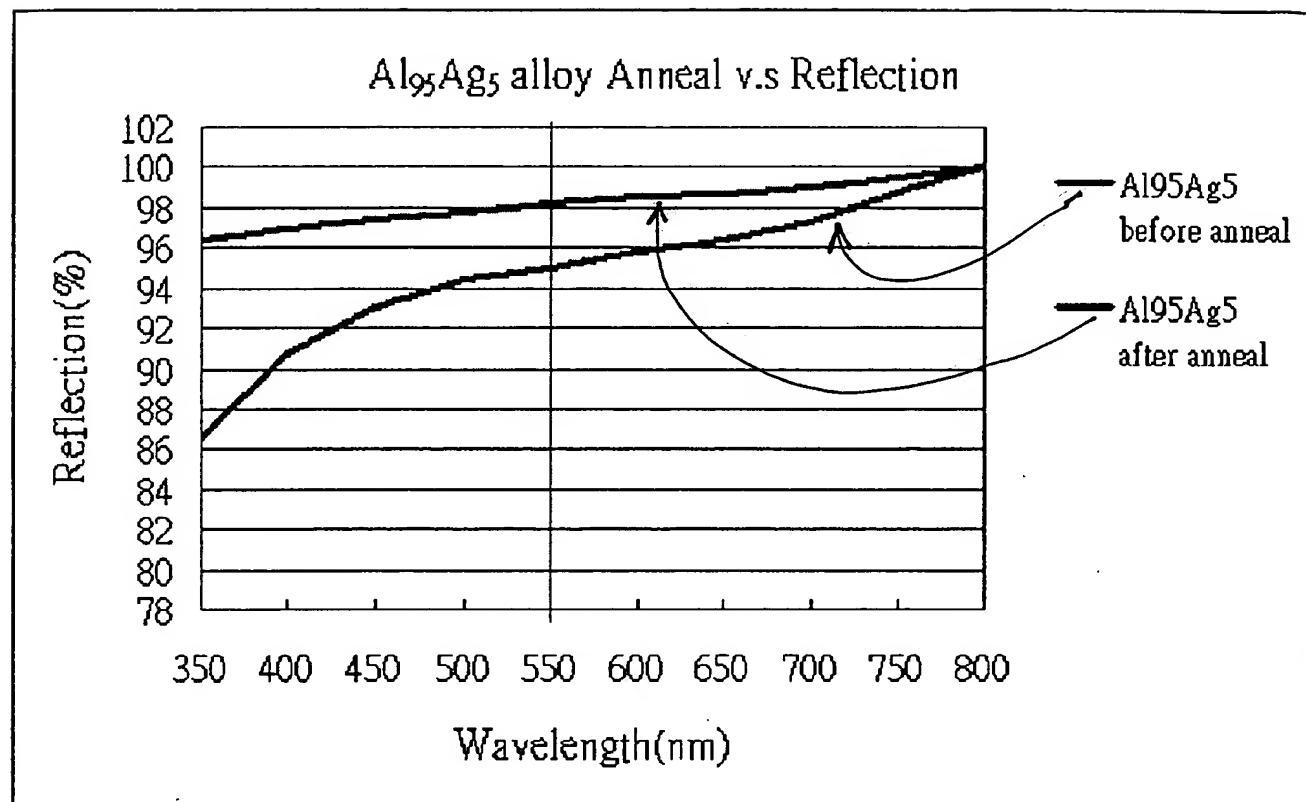
To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

**LOWE HAUPTMAN GILMAN & BERNER, LLP**

Benjamin J. Hauptman  
Registration No. 29,310

*USPTO Customer No. 22429*  
1700 Diagonal Road, Suite 310  
Alexandria, VA 22314  
(703) 684-1111 BJH/KL/klb  
(703) 518-5499 Facsimile  
**Date: July 31, 2003**



*Exhibit A*